POVERTY MATTERS

A Reassessment of the Inequality–Homicide Relationship in Cross-National Studies

WILLIAM ALEX PRIDEMORE*

Dozens of cross-national studies of homicide have been published. Virtually all have reported an association between inequality and homicide, leading scholars to draw strong conclusions about this relationship. Unfortunately, each of these studies failed to control for poverty, even though poverty is the most consistent predictor of area homicide rates in the US empirical literature and a main confounder of the inequality–homicide association. The cross-national findings are also incongruent with US studies, which have yielded inconsistent results for the inequality–homicide association. In the present study, I replicated two prior studies in which a significant inequality–homicide association was found. After the original results were replicated, models that included a measure of poverty were estimated to see whether its inclusion had an impact on the inequality–homicide association. When effects for poverty and inequality were estimated in the same model, there was a positive and significant poverty–homicide association, while the inequality–homicide association disappeared in two of three models. These findings were consistent across different samples, data years, measures of inequality, dependent variables (overall and sex-specific homicide rates) and estimation procedures. The new results are congruent with what we know about poverty, inequality and homicide from the US empirical literature and suggest that the strong conclusions drawn about the inequality–homicide association may need to be reassessed, as the association may be a spurious result of model misspecification.

Keywords: homicide, poverty, inequality, cross-national studies

Introduction

The theoretical literature addressing the association between social structure and violence has a long history in Europe and the United States. The tradition of empirically testing these ideas employing cities, states and nations as units of analysis began in earnest in the late 1960s and early 1970s. Since that time, the association between social structure and homicide has been the focus of several dozen published cross-national studies (for reviews, see LaFree 1999; Pridemore and Trent 2010), with a far greater number of studies examining this association using sub-national units within the United States (for reviews, see Messner and Rosenfeld 1999; Pratt and Cullen 2005).

Economic conditions have received significant attention in both US and cross-national studies of social structure and homicide. These two literatures, however, have come to very different conclusions about the impact of poverty and inequality on homicide rates. Until recently, this disagreement has not been scrutinized in the literature.

* PhD, Indiana University, Department of Criminal Justice, Sycamore Hall 302, Bloomington, IN 47405, USA; wpridemo@indiana.edu.
In brief, US studies have consistently found poverty to be associated with homicide rates, while the results of tests for an association between inequality and homicide have been inconsistent. In the cross-national literature, on the other hand, the association between inequality and homicide has been so consistent that very strong conclusions have been made about this relationship.

In addition to the differing conclusions drawn from these two literatures, another key feature is that only a single cross-national study explicitly included a control for poverty. This raises the possibility that the inequality–homicide association so often found in the cross-national literature is a spurious result of model misspecification. Another hint that the strong conclusions drawn about the inequality–homicide association at the cross-national level may have been premature comes from the one cross-national study that included a control for poverty. In it, Pridemore (2008) found that when poverty and inequality were included in the same model, the poverty–homicide association was significant and the inequality–homicide association was not.

In this paper, I examine these issues by first reviewing the main conclusions drawn from the cross-national and US literatures on social structure and homicide and pointing out the inconsistencies between the two. To address the empirical question of the possibility of model misspecification in prior cross-national analyses, I then revisit briefly the Pridemore (2008) study and replicate two recent important, careful and thorough studies that found an inequality–homicide association. Once the latter two studies have been replicated, I add to their models a proxy for poverty to determine whether (1) there is a poverty–homicide association at the cross-national level and (2) the inequality–homicide association remains after controlling for poverty.

The contributions of the present study go well beyond Pridemore (2008). First, a single study (especially in the social sciences and macro criminology) does not provide a definitive answer to any question. Second, the Pridemore (2008) findings are already generating further research on this topic (Messner et al. 2010; Paré and Felson 2010) and the present study addresses a crucial question—what happens to the conclusions drawn from the existing empirical literature when we include a key control missing from their models?—that is not covered by these other studies. Third, the Pridemore (2008) study, while using similar approaches to prior analyses, collected new data and possessed its own idiosyncrasies. An easy critique is that these idiosyncrasies are the source of his different findings. By replicating and extending prior published studies (using their own data and methods) that are already part of the existing cross-national literature, new evidence is presented independently of Pridemore (2008). Fourth, the findings from the present study will be important to the literature on social structure and violence, no matter what the results. If the inequality–homicide association remains when poverty is included, then we have shown the relationship holds when controlling for a key confounder. On the other hand, if the association disappears when poverty is included in the model, then it is likely that prior findings were at least partially the result of model misspecification and we may need to re-evaluate the very strong conclusions drawn thus far about the inequality–homicide association at the cross-national level. Fifth, in carrying out this exercise, I learned of another important and unaddressed limitation to the scientific record on social structure and homicide at the national level. This limitation concerns issues of data sharing for the purposes of replication, which is a fundamental element of the accumulation of knowledge, and I report on this here.
The cross-national literature

What follows is not meant to be an exhaustive review of the cross-national and US literatures on social structure and homicide. Instead, it focuses on the conclusions drawn from these two literatures as they relate to the effects of inequality and poverty on homicide rates. Table 1 contains information on nearly four dozen cross-national studies of social structure and homicide published since 1965. The table shows the authors of the study, the data years used, the number of nations included in the analysis, the measure of inequality employed, the measure of poverty, any other economic measures included in the analysis and a list of control variables. While this list is not exhaustive, it contains all studies included in LaFree’s (1999) thorough review of cross-national homicide studies, a few recent studies published after LaFree’s review and summarizes the typical cross-national study one finds in the literature.

Table 9.1 in LaFree’s review shows that with one exception (Messner 1982), in all studies showing a significant inequality–homicide association the relationship is in the positive direction. In recent years, the inequality–homicide association in these cross-national studies has been found with such consistency that scholars have drawn very strong conclusions about its existence. Messner and Rosenfeld (1997), for example, stated that a ‘finding that has emerged with remarkable consistency is that high rates of homicide tend to accompany high levels of inequality’ (Messner and Rosenfeld 1997: 1394). Similarly, in his review of the cross-national homicide literature, LaFree (1999) concluded that a ‘positive association between economic inequality and homicide rates is among the most consistent findings in the cross-national literature’ (LaFree 1999: 141).

Over time, this consistency continued and the acceptance of the association solidified. For example, many scholars now take the existence of the inequality–homicide association as a point of departure when testing theories in which certain national features are suspected of moderating inequality’s effect on homicide rates, such as tests of institutional anomie theory (Messner and Rosenfeld 1997; Savolainen 2000) and social support theory (Pratt and Godsey 2003). For some, the discussion began to move beyond correlation to causation. For example, Fajnzylber, Lederman and Loayza (2002) stated that violent crime ‘and inequality are positively correlated within countries and, particularly, between countries, and this correlation reflects causation from inequality to’ rates of violence (Fajnzylber et al. 2002: 1). In recent years, the presence of the association has become so accepted as to be assumed. Wilkinson (2004), for example, entitled his article ‘Why Is Violence More Common where Inequality Is Greater?’ and the first sentence of the abstract of that paper states definitively that ‘[t]he most well-established environmental determinant of levels of violence is the scale of income differences between rich and poor’ (Wilkinson 2004: 1).

Lest this discussion be viewed as a critique of these prior studies or scholars, it should be stated that the summaries, conclusions and assumptions mentioned to this point were on target. Many of these scholars were simply summarizing the results of prior studies and were correct in their conclusions about the consistency of the inequality–homicide association. The current article is not a critique of the earlier studies or of those who have summarized their findings. What is necessary, however, is to point out a vital omission in the prior cross-national studies as it relates to the US literature on social structure and homicide, and then attempt to correct for it.
<table>
<thead>
<tr>
<th>Author (date)</th>
<th>Data year(s)</th>
<th>Number of countries</th>
<th>Measure of inequality</th>
<th>Measure of poverty</th>
<th>Other economic measures</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Bennet (1991a)</td>
<td>1960–84</td>
<td>52 (in sample) 47 (in analysis)</td>
<td>Ray and Singer’s index of concentration</td>
<td>–</td>
<td>Level of development (GDP per capita) Rate of economic growth</td>
<td>Attractive targets (GDP per capita) Accessibility of goods Size of (juvenile) pool Urbanization Female labour force partic. Type of dataset Labour force participation</td>
</tr>
<tr>
<td>3 Bennet (1991b)</td>
<td>1960–84</td>
<td>52 (in sample) 43 (in analysis)</td>
<td>Ray and Singer’s index of concentration</td>
<td>–</td>
<td>Economic development (GDP per capita)</td>
<td>Social security expenditures (as percentage of GNP) GNP level (high or low)</td>
</tr>
<tr>
<td>5 Braithwaite (1979)</td>
<td>1955–64 (dates vary for each country and variable)</td>
<td>20 (1st analysis) 29 (2nd analysis)</td>
<td>Lydall’s ordinal scaling on earnings inequality</td>
<td>–</td>
<td>Social security expenditures (as percentage of GNP) GNP level (high or low)</td>
<td>–</td>
</tr>
<tr>
<td>6 Braithwaite and Braithwaite (1980)</td>
<td>1955–74</td>
<td>31 (19 and 20 in later analyses)</td>
<td>Gini coefficient (though a number of others tested)</td>
<td>–</td>
<td>Protein grams per capita (1st analysis) GDP per capita (2nd analysis)</td>
<td>Political freedom Ethnic fractionalization Strength of socialist parties</td>
</tr>
<tr>
<td>7 Conklin and Simpson (1985)</td>
<td>1967–70</td>
<td>52</td>
<td>Infant mortality rate (as indicator of social inequality)</td>
<td>–</td>
<td>–</td>
<td>Percentage of males 15–29 Persons per square mile Population size Percentage urban Energy cons. per capita School enrolment ratio Life expectancy Sex ratio Telephones per 100 inhab.</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>--------------------</td>
<td>-------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8 Fajnzylber, Lederman and Loayza (2002)</td>
<td>1965–94</td>
<td>20</td>
<td>Gini coefficient (and ratio poorest to richest income quintile shares)</td>
<td>–</td>
<td>GNP per capita (in logs) GDP growth rate</td>
<td>Geographic location Cultural heritage Average years of education Urbanization Status of females in society Female labour force partic. Speed of social change Degree to which violence is culturally accepted Surveillance at gov’t level Community surveillance Surveillance by family and friends</td>
</tr>
<tr>
<td>9 Fiala and LaFree (1988)</td>
<td>Various dates from 1960 to 1977 (different data years for almost every variable)</td>
<td>40 (but varies for each regression from 16 to 40)</td>
<td>Percentage income going to poorest 20% families Ratio of top 20% to bottom 40% income</td>
<td>–</td>
<td>Unemployment rate Level of development (per capita GNP and log per capita GNP) Societal attempts to limit economic deprivation</td>
<td>Unemployment rate Level of development (per capita GNP and log per capita GNP) Societal attempts to limit economic deprivation</td>
</tr>
<tr>
<td>10 Gartner (1991)</td>
<td>1965–80</td>
<td>17 at multiple time points</td>
<td>–</td>
<td>–</td>
<td>Social security expenditures as percentage of GDP</td>
<td>Illegitimate birth rate Teen mother birth rate Child (&lt;5) to woman ratio Crude divorce rate Female labour force partic. Loss of life in 20th c. wars Female share in uni. enroll. Female share in labour force Female share unmarried Female share of population Illegitimacy rate Divorce rate Occupational desegregation</td>
</tr>
<tr>
<td>11 Gartner, Baker and Pampel (1990)</td>
<td>1950–80</td>
<td>18 at multiple time points</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>17 Jacobs and Richardson (2008)</td>
<td>1975–95</td>
<td>14 at multiple time points</td>
<td>Gini coefficient</td>
<td>–</td>
<td>Unemployment rate GDP per capita</td>
<td>Avg. persons per household Percentage labour force non-agri. Educational enrolment Telephones per 100 Urbanization</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>21 Krohn (1978)</td>
<td>1965 (with some independent variables taken from 1972 World Handbook)</td>
<td>33</td>
<td>Gibbs and Martin’s measure of the division of labour</td>
<td>–</td>
<td>GNP per capita (as part of Feieraband measure of systemic frustration, see right)</td>
<td>Total population Urbanization (‘urbanity’) Level of energy consumption per capita Feierabend measure of systemic frustration: literacy rates minus radios, telephones and newspapers per capita and GNP per capita</td>
</tr>
<tr>
<td>22 Krohn and Wellford (1977)</td>
<td></td>
<td>59</td>
<td>–</td>
<td>–</td>
<td>GNP per capita</td>
<td>Political orientation Population size</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>--------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Lee (2001)</td>
<td>1987–93 (homicide) 1985–90 (pop. growth) 1995 (inequality)</td>
<td>50</td>
<td>Percentage of nation’s wealth held by richest 20%</td>
<td>–</td>
<td>GDP per capita</td>
<td>Births to unmarried mothers, Marriage/divorce ratio, Mental health contacts, Population growth, Political rights index, Civil liberties index, Population density, Infant mortality rate (as measure of social inequality, not tested individually but included as part of a development index), Population size, Population age 15–19, Urbanization</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>32 Messner and Rosenfeld (1997)</td>
<td>1980–90</td>
<td>45 (in sample) 39–45 (in analyses)</td>
<td>Gini coefficient Economic discrimination index (using Gurr’s data)</td>
<td>–</td>
<td>Decommodification of labour (measured by welfare exp. as percentage of GDP, welfare exp. per capita, percentage of total benefit exp. allocated to employment injuries) GNP per capita</td>
<td>Inf. mort. rate (as part of development index) Life expectancy Percentage population &gt;64 Population growth Urbanization Males per 100 females</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Neapolitan (1998)</td>
<td>1988–94 (though income inequality data may be from late 1960s)</td>
<td>118 (in sample) 78 (in inequality analyses)</td>
<td>Ratio of percentage income of top 10% to bottom 20%</td>
<td>–</td>
<td>GNP per capita</td>
<td>Development level Urbanization Racial classification Percentage of population age 15–29 Average household size Economic discrimination index (see Messner and Rosenfeld) GDP per capita</td>
</tr>
<tr>
<td>Ortega et al. (1992)</td>
<td>1969–82 (varies by data availability)</td>
<td>51</td>
<td>–</td>
<td>–</td>
<td>GNP per capita</td>
<td>Age structure/distribution Urbanization Total population Percentage GDP spent healthcare Percentage GDP spent public educ. Males per 100 females Urbanization Percentage 1-yr-olds immunized for measles Western nation or not</td>
</tr>
<tr>
<td>Pratt and Godsey (2002)</td>
<td>1989–95</td>
<td>46</td>
<td>Ratio of richest to poorest 20%</td>
<td>–</td>
<td>Human development index (as measured by life expectancy, adult literacy rates, educational enrolment, GDP per capita and age composition)</td>
<td>Western nation or not</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Pratt and Godsey (2003)</td>
<td>1989–95</td>
<td>46</td>
<td>Ratio of richest to poorest 20%</td>
<td>–</td>
<td>Human development index</td>
<td>Percentage GDP on health care, Males per 100 females, Urbanization, Age structure/distribution, Disorg. index (as measured by age structure, sex ratio, inf. mort., percentage pop. age 15–19 never married, pop. growth), Incarceration rate, Percentage of 1-yr-olds immunized for measles, Education, Urbanization, Percentage young males, Industrialization, Urbanization, Drunken brawling, Military authority, Political authority, Political oppression, Population size, Typical settlement size, Wife beating, Change in moral codes, Change in trad. authority, Change in subsist. occup., Divorce, Population density, Judicial authority, Organizational complexity, Largest settlement size, Technological complexity</td>
</tr>
<tr>
<td>Quinney (1965)</td>
<td>1953–60</td>
<td>48</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Industrialization, Urbanization, Drunken brawling, Military authority, Political authority, Political oppression, Population size, Typical settlement size, Wife beating, Change in moral codes, Change in trad. authority, Change in subsist. occup., Divorce, Population density, Judicial authority, Organizational complexity, Largest settlement size, Technological complexity</td>
</tr>
<tr>
<td>Rosenfeld and Messner (1991)</td>
<td>Multiple</td>
<td>32</td>
<td>Caste strat. Class strat. Relative dep. measured as composite of diff. between culturally prescribed and actually achieved wealth, power and status</td>
<td>–</td>
<td>–</td>
<td>Industrialization, Urbanization, Drunken brawling, Military authority, Political authority, Political oppression, Population size, Typical settlement size, Wife beating, Change in moral codes, Change in trad. authority, Change in subsist. occup., Divorce, Population density, Judicial authority, Organizational complexity, Largest settlement size, Technological complexity</td>
</tr>
<tr>
<td>Author (date)</td>
<td>Data year(s)</td>
<td>Number of countries</td>
<td>Measure of inequality</td>
<td>Measure of poverty</td>
<td>Other economic measures</td>
<td>Controls</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>--------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Savolainen (2000)</td>
<td>1980–90 (1st analysis) 1990 (2nd analysis)</td>
<td>45 (1st analysis) 32 (2nd analysis)</td>
<td>Gini coefficient d Economic discrimination index Gini coefficient</td>
<td>–</td>
<td>Decommodification of labour Development index (measured by GHP per capita, life exp., inf. mort., elderly pop., pop. growth, urban develop.) GDP per capita</td>
<td>Males per 100 females Gender of victims Percentage of public expenditures on social security and other welfare programs Age structure Males per 100 females</td>
</tr>
<tr>
<td>Steffensmeier et al.</td>
<td>1970–76</td>
<td>69</td>
<td>–</td>
<td>–</td>
<td>Occupational segregation</td>
<td>Energy per capita Percentage female uni. students Radios per capitaSuicide rate</td>
</tr>
<tr>
<td>Unnithan and Whitt</td>
<td>1950–70</td>
<td>31</td>
<td>Kuznets index</td>
<td>–</td>
<td>GNP per capita</td>
<td>GNP per capitaSuicide rate</td>
</tr>
<tr>
<td>Wolf (1971)</td>
<td>1971</td>
<td>17</td>
<td></td>
<td>–</td>
<td>GNP per capita</td>
<td>GNP per capitaSuicide rate</td>
</tr>
</tbody>
</table>
Examining the ‘Measure of poverty’ column in Table 1, we see that for nearly every study, the column is blank. In one instance, GNP per capita was employed as a measure of poverty, but, as I discuss below, this is an invalid indicator of absolute deprivation. In one other study (Messner 1989), the author discussed poverty and initially included reasonable proxies (e.g. infant mortality and life expectancy). When estimating models, however, these proxies were included together with other measures in an index meant to represent development and thus their individual effects on homicide could not be discerned. The general point to be made here is that in the dozens of studies that have resulted in the strong conclusions about the inequality–homicide association, not a single one included a control for poverty. The reason why this is so important is made clear when summarizing the empirical literature on social structure and homicide in the United States.

The US literature

Relative to cross-national studies, there have been considerably more studies of social structure and homicide within the United States and the latter are usually more sophisticated than the former. The greater sophistication is due mainly to (1) more and better data sources for both the independent and dependent variables, (2) a more thorough understanding of the strengths and weaknesses of these data collection instruments relative to knowledge about international sources, and (3) the greater theoretical and methodological care that results from being subjected to more rigorous peer review of studies over time.

Throughout the 1970s, several US studies found a consistent association between poverty and homicide at both the state and city levels. The Blau and Blau (1982) and Messner (1982) studies published in 1982, however, shifted the focus away from poverty and towards inequality, and a meta-analysis by Hsiegh and Pugh (1993) a decade later suggested essentially equal footing for poverty and inequality in their associations with homicide rates. Since then, however, poverty has been the more consistent predictor of area homicide rates, while the findings for inequality have been mixed.

In their extensive review of the literature for the National Research Council, Sampson and Lauritsen (1994) found that ‘[a]lmost without exception, studies of violence find a positive and usually large correlation between some measure of area poverty and violence – especially homicide’ (Sampson and Lauritsen 1994: 63). Similarly, in their thorough review for a comprehensive sourcebook on homicide research, Messner and Rosenfeld (1999) stated that ‘poverty appears to be an important component of the correlated causes that consistently accompany high aggregate levels of homicide’ (Messner and Rosenfeld 1999: 28). Further, Pratt and Cullen (2005) undertook a meta-analysis of empirical studies of social structure and homicide, finding that ‘the effect of poverty was one of the five macro-level predictors to receive scores of high for both strength and stability of effects’ (Pratt and Cullen 2005: 412). Finally, in another review of the literature, Messner (1989) appears to be the only one to address the theoretical and methodological aspects of the debate over absolute versus relative deprivation in the cross-national literature. He also recognized the limitations of GNP as an indicator of poverty and included better proxies for poverty (i.e. infant mortality and life expectancy). These proxies were not tested individually, however, but instead included together with other measures in an index of societal development.

Only two of the remaining four variables found to be high on both strength and stability of effects directly represent a theoretical concept. These two are family disruption and incarceration. The remaining two are per cent non-white and per cent black. The effects of inequality were found to be ‘moderate’ in both strength and stability.
Pridemore (2002) concluded that ‘the positive relationship between poverty and homicide is the most consistent finding in the literature’ (Pridemore 2002: 144).

On the other hand, the results for the inequality–homicide association in the US literature are mixed. Several studies showed a positive and significant association, though many others, including one by Messner (1982) that was vital to stimulating interest in this area, revealed no association. In their review of the US literature, Messner and Rosenfeld (1999) concluded that ‘the evidence is once again mixed, and it is difficult to reach unambiguous conclusions about the effects of inequality on homicide rates’ (Messner and Rosenfeld 1999: 30). On the same topic, Pridemore (2002) concluded that the ‘empirical evidence for positive effects of inequality on homicide rates have been neither as strong nor as consistent as those for poverty . . . [and] the reasons cited for this inconsistency are the same ones through which the poverty findings hold up: disparate samples, differing operationalizations, varying levels of analysis, and multicollinearity’ (Pridemore 2002: 144).

In sum, the conclusions drawn from the US empirical literature on social structure and homicide are different from those drawn from the cross-national literature. First, in the United States, poverty is consistently associated with area homicide rates, while, in the cross-national literature, poverty has not even been tested. Second, in the cross-national studies, the inequality–homicide association is so consistent that scholars have drawn strong conclusions about the relationship and most take it for granted. In the US literature, on the other hand, the findings for the inequality–homicide association are mixed: sometimes positive and significant, sometimes null. The most important aspect of this incongruence is that the inequality–homicide association in the US literature is most erratic when poverty is included in the same model, while in the cross-national literature poverty is never included. This leads to the question of what happens to the inequality–homicide association in cross-national studies when we control for poverty.

The lacuna

The incongruence in the conclusions drawn from the cross-national and US empirical literatures is accompanied by a gap in the former: the failure to test the poverty–homicide association or to even control for poverty when testing other hypotheses. This lacuna is important both theoretically and methodologically.

The failure to control for poverty is questionable theoretically, as there are reasons to believe that poverty is associated with area homicide rates. Although the exact causal mechanisms are debated, several theoretical traditions—including conflict, opportunity, social disorganization, strain and sub-cultural theories—posit a link between absolute deprivation and violence. As shown above, the empirical literature provides considerable support for this hypothesis. With such a sizeable empirical literature on social structure and homicide at the cross-national level, the observer is left to wonder why the poverty–homicide thesis has not been a central component of cross-national studies, let alone why it has not been tested at all.

Several cross-national studies do include a measure of per capita GDP or GNP. While most authors do not claim GDP/GNP is a measure of poverty, many treat it as such in their discussions. While GDP/GNP may be considered a measure of development or
average well-being in a nation, it cannot be considered a measure of poverty, as it does not represent the bottom end of the income or wealth distribution, which is the concern of poverty theorists. Two nations with the same per capita GDP/GNP can easily vary substantially in the proportion of their populations living in poverty. In the end, absolute deprivation is theoretically distinct from general well-being and including a measure of the latter is not assurance that one has controlled for the former.

The failure to control for poverty in cross-national studies of homicide is also questionable methodologically. First, it means we are not controlling for the most consistent predictor of homicide rates. Just as importantly, it means that we are not controlling for the main confounder of the inequality–homicide association. In other words, while inequality almost always exhibits a strong bivariate correlation with homicide rates in the United States, it is when poverty is included in the same model with inequality that the results for the latter (but not usually the former) often become inconsistent. These related points suggest that prior cross-national studies suffer from model misspecification.

The aforementioned inclusion of a measure of per capita GDP/GNP in several studies also has methodological ramifications. Since GDP/GNP is not a measure of poverty, it cannot be expected to capture and control for the latter’s effect on homicide. Until now, we may have been accidently lulled into thinking of the inequality–homicide association as robust because if we allow ourselves to consider GDP/GNP a measure of poverty, then we think the inequality–homicide association is strong and consistent, since it remains when ‘poverty’ is controlled.

What we should expect  The main question that arises from all this is the following: are the prior inequality–homicide findings the result of misspecified models and, if so, does this call into question the strong conclusions about the cross-national research outlined above? The first part of this question can be answered simply by including a control for poverty in models assessing the association between inequality and homicide at the cross-national level. There are two competing expectations when this is done.

The first expectation is that the inequality–homicide association will remain. This would be an important finding, for multiple reasons. It would mean that, despite prior model misspecification, inequality theory is still supported even when the main confounder is included in the model. Substantively, this would also suggest that the association between inequality and homicide victimization at the national level is different from the association at the sub-national level (at least based on US studies). Yet, if the inequality–homicide association at the cross-national level remains after correcting for the main methodological flaw in prior studies, this provides a compelling reason to examine the relationship more closely and attempt to understand why the strength of the association varies by unit of analysis.

The competing expectation is that the inequality–homicide association will disappear. This finding would also be important. It would be inconsistent with what we think we know from prior studies and it would call into question the strong conclusions drawn from the existing cross-national empirical literature. On the other hand, this finding would reconcile the differences between the US and cross-national literatures because it would mean the inequality–homicide association would be null or inconsistent in both. Bringing congruence to these literatures would represent a substantial innovation to research on social structure and violence.
Hypotheses

Given the review of the US and cross-national theoretical and empirical literatures on social structure and homicide, my hypotheses are as follows:

1. Inequality and homicide will be associated in models that include neither GDP nor poverty.
2. The inequality–homicide association will remain when GDP is included in the models.
3. There will be a significant association between poverty and homicide when inequality is not included in the models.
4. When inequality and poverty are included in the same models, the inequality–homicide association will disappear or be inconsistent, while the poverty–homicide association will remain.

Data, Method and Results

To test these hypotheses, I first revisit the findings from Pridemore (2008) then carry out two additional and independent analyses. The first additional analysis replicated a study by Fajnzylber et al. (2002). The second additional analysis replicated a study by Savolainen (2000). The nations, years and control variables employed by these three studies were quite different and, thus, any consistent findings across the three studies should be considered meaningful and not simply repeating the same findings with similar data.

The same systematic approach was employed in all three cases. For the additional analyses, the first step was to replicate the findings of the prior studies from the data provided to me by the authors. In all three studies, the next step was to estimate a general model that included inequality and the typical controls, but not GDP (or GNP, depending upon the measure used in the original studies). The next step was to include a model with both inequality and GDP/GNP to see whether the latter’s inclusion influenced the inequality–homicide association. The next step was to replace inequality with a measure of poverty to see whether a poverty–homicide association exists with the data from each study. The final step was to include inequality and poverty in the same model to assess the effects of each on homicide controlling for the other.

The Pridemore study

The Pridemore study appeared in Criminology in 2008. The reader is encouraged to consult the original article for details concerning measurement and method. The study employed data on 46 countries from 2000. The nations employed for this analysis are listed in Appendix A. The author measured inequality in two different ways. The first was the standard Gini coefficient. The second measure, employed to make sure that any results were not sensitive to the use of the Gini coefficient as a measure of inequality (Messner et al. 2002), was the ratio of the income or consumption share of the top 20 per cent of the population relative to the bottom 20 per cent of the population.

One potential reason why inequality–homicide studies do not include a control for poverty might be because there is not a common single measure of this concept available for most nations. Defining and measuring poverty is difficult, especially for nations at
different levels of development. While the United Nations provides a Human Poverty Index (HPI), for example, there are actually two different indices, one for developing nations (HPI-1) and one for the countries of the OECD, Central and Eastern Europe, and the CIS (HPI-2). Similarly, the population below the income poverty line is computed differently for these two sets of nations. Although a direct measure of poverty is unavailable for all nations, infant mortality is commonly used as a proxy, and this was the indicator (defined as the number of infant deaths per 1,000 live births) employed by Pridemore.

The results of the author’s analysis appear in Table 2 on p. 142 of the original article and can be summarized as follows. First, there was a positive and significant inequality–homicide association when poverty was not included ($\beta = 0.37, p = 0.042$). Second, this association remained when GDP was included. Third, there was a positive and significant poverty–homicide association when inequality was not included in the model ($\beta = 0.55, p = 0.028$). Finally, when both poverty and inequality were included in the same model, poverty retained its association with homicide ($\beta = 0.52, p = 0.030$) but the inequality–homicide association disappeared ($\beta = 0.19, p = 0.203$).

Replication and re-estimation of Fajnzylber et al.

The Fajnzylber et al. (2002) study appeared in the Journal of Law and Economics. The reader should consult the original article for details concerning measurement and method. The study employed data on 39 countries from 1965 to 1994, undertaking three different analyses to examine the inequality–homicide relationship: pooled levels, pooled first differences and country averages. Only the ‘country average’ approach is replicated and reanalysed here, since it most closely resembles the typical cross-national homicide study. There were six observations for each country in the study, one for each five-year period between 1965 and 1994. While most nations had some missing data, available data for each variable were first averaged over each five-year time frame. In the ‘country average’ analysis, the authors averaged these averages to get a single score for each nation on each of the variables over the entire period. See Appendix B, Table B1, in Fajnzylber et al. (2002) for a list of the nations and the number of observations (i.e. five-year averages) for each nation. I provide a list of nations employed by these authors in Appendix A.

The authors used the Gini coefficient to measure inequality, which was correlated with the averaged homicide rate at 0.58 (see Table 1, p. 10, in the original study). The results of their three analyses appear in Table 3 on p. 13 of the original article. Based upon the data provided to me by the second author of their study, I was able to replicate the ‘country averages’ analysis, which is Model 3 in Table 3 in their article and Model 1 in Table 2 in the present paper. Their findings show the expected positive and significant association between inequality and homicide ($\beta = 0.56, p = 0.006$). The authors drew the same inferences with two alternative measures of inequality: the 20–20 ratio described in the Pridemore study above and income polarization.

After replicating their initial findings, I made two small changes before estimating new models to test my hypotheses. First, China was dropped from the analysis because it reported an unrealistically low homicide rate of 0.18 per 100,000. Second, Hong Kong was excluded.

---

3 See Pridemore (2008) for a discussion of model sensitivity and the robust findings.
4 In their paper, Fajnzylber et al. report only the unstandardized coefficient and t-statistic. The standardized coefficient and p-value reported in my text here are taken from my replication.
from the re-estimated models containing poverty because data were not available on this variable. Model 2 in Table 2 provides the results of the basic model. As expected, inequality is positively and significantly associated with homicide \((\beta = 0.51, p = 0.006)\). Model 3 shows the results when the natural logarithm of GNP is included in the model. This is essentially the same as Model 1 without the inclusion of China in the sample, and it shows that (1) my small change to the data did not have an impact on the main issues at hand (i.e. compare these results to the authors’ original results as reported here in Model 1) and (2) when GNP is included, the inequality–homicide association is still significant \((\beta = 0.43, p = 0.012)\), again confirming my hypothesis.

Model 4 replaces inequality with a measure of poverty. The infant mortality rate was used as a proxy for poverty. I collected data on infant mortality for each of the five-year periods used for each nation, averaging this measure in the same manner as the original authors averaged theirs. The skew statistic for this measure was more than twice its standard error and, thus, the natural logarithm of these values was used when estimating models. As with the Pridemore (2008) study outlined above, the measure of GNP was dropped from this and the final model because of high levels of multicollinearity, but also, as before, the same inferences for inequality and poverty were obtained whether GNP was included or excluded. The results in Model 4 show a positive and significant association between poverty and homicide. An informal comparison reveals a higher standardized coefficient for poverty than for inequality in the earlier models. Finally, Model 5 shows the results when both are included in the model (the bivariate correlation between inequality and poverty here is 0.63). The findings reveal that when poverty is included in the same model as inequality, poverty retains its significant association with homicide rates \((\beta = 0.90, p < 0.001)\) and the inequality–homicide association disappears \((\beta = 0.07, p = 0.363)\).

Replication and re-estimation of Savolainen

The Savolainen article appeared in *Criminology* in 2000. The reader should consult the original study for details about measurement and method. The first part of Savolainen’s article obtained data from, replicated and extended an earlier analysis by Messner and Rosenfeld (1997), the results of which appear in Table 1 in Savolainen’s article. In the present analysis, I focus on the results presented by the author in Table 2 in his article, for which he collected new data to further test his theory. Unlike Fajnzylber et al. (2002), this was a cross-sectional analysis (of 32 nations) with observations taken at generally the same time (i.e. 1990). My Appendix A shows the nations included in his sample. Savolainen did not carry out his analysis on the overall homicide rate, but instead disaggregated it into male and female homicide victimization rates.

Savolainen used the Gini coefficient as his measure of inequality, which had bivariate correlations of 0.70 and 0.35 with male and female homicide rates, respectively (see Appendix B, Table 3, in his article). His results from the multivariate analyses appear in Table 2 on p. 1034 of his article. In my reanalysis, I focused only on Models 1 and 3 in that table (i.e. the models for men and women, respectively, that did not include his interaction term testing institutional anomie theory). Based on the data provided to me by the author, I was able to replicate exactly the results of these two models. These two replications are shown here as Model 1 in Tables 3 (males) and 4 (females). The
findings show the expected positive and significant association between inequality and homicide ($\beta = 0.57$, $p = 0.001$ for males, $\beta = 0.34$, $p = 0.077$ for females).\footnote{Given the small sample size (i.e. $n = 32$), the more liberal interpretation by Savolainen of this $p$-value is reasonable.}

After replicating these original findings, I made a few small changes before estimating new models to test my hypotheses. First, in Savolainen’s analyses, the absolute value of the proportion of the population aged 15–24 was used. I employed the natural logarithm of these values because the skew statistic for this variable was more than twice its standard error. Second, in Savolainen’s original model, the values for inequality and welfare spending were centred because they were included as an interaction term in subsequent models. I used the original values for these variables. Further, since the skew statistic for the Gini coefficient was nearly twice its standard error, I used the natural logarithm of these values.\footnote{Technically, logging the values of these two variables changes the functional form of the model. While appropriate given the distribution of the variables, this changes slightly my replication of the original study. Therefore, I re-estimated all eight models (four each for men and women) of the Savolainen replication using the original unlogged values. In all models, there were no differences to the inferences or to the original conclusions drawn about inequality, poverty and homicide. These results are available from the author upon request.} Model 2 in Tables 3 and 4 provide results for the basic inequality model. As expected, they reveal a positive and significant association between inequality and homicide rates ($\beta = 0.71$, $p < 0.001$ for males, $\beta = 0.52$, $p = 0.028$ for females). Model 3 in each of these tables shows the findings when GNP per capita was included. The results again confirm my hypothesis that the inclusion of this measure does not have a major influence on the inequality–homicide association, which is still positive and significant in both models.

Model 4 in Tables 3 and 4 replaces inequality with poverty. The infant mortality rate (in this case, for the year 1990) was the proxy for poverty and the natural logarithm of these values was used, since the skew statistic for the distribution was greater than twice its standard error. As with the two prior analyses discussed above, high levels of multicollinearity led me to drop the GNP measure from Models 4 and 5. Nevertheless, also as with the results reported for the prior two analyses, the inferences drawn for the poverty and inequality variables were the same whether or not GNP was included. The results in Model 4 in both tables show a positive and significant association between poverty and homicide rates ($\beta = 0.85$, $p < 0.001$ for males, $\beta = 0.76$, $p = 0.004$ for females) and, again, informal comparisons with results from Model 2 show the standardized coefficients for poverty to be considerably larger than those for inequality. Finally, Model 5 shows the results when poverty and inequality were included in the same model (note that the bivariate correlation between inequality and poverty here was 0.73 and the more general issue of multicollinearity in studies such as these is addressed in the ‘Limitations’ section below). The finding for males was the one case in the four examples provided in this article in which the inequality–homicide association remained significant ($\beta = 0.38$, $p = 0.037$) when poverty was included in the model, though the size of the standardized coefficient shrank considerably compared to earlier models. The results for males also show a positive, significant and substantially stronger association (relative to inequality) between poverty and homicide ($\beta = 0.60$, $p = 0.007$). The results for female homicide victimization in Table 4 are consistent with the prior two analyses reported above. In other words, the findings reveal a positive and significant association between poverty and homicide ($\beta = 0.65$, $p = 0.031$), while the inequality–homicide association disappears ($\beta = 0.17$, $p = 0.293$).
Table 2 Results of Fajnzylber et al. replication and re-estimation

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1: Fajnzylber modeld</th>
<th>Model 2: Basic inequality model</th>
<th>Model 3: Inequality with GNP</th>
<th>Model 4: Poverty replaces inequalityc</th>
<th>Model 5: Inequality and poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>t-statistic</td>
<td>b (β)</td>
<td>p-value</td>
<td>b (β)</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.17</td>
<td>0.58</td>
<td>0.01</td>
<td>0.498</td>
<td>3.05</td>
</tr>
<tr>
<td>GDP growth</td>
<td>–12.03</td>
<td>–1.67</td>
<td>–2.97 (–0.06)</td>
<td>0.354</td>
<td>1.98 (0.04)</td>
</tr>
<tr>
<td>LnGNP per capita</td>
<td>–0.35</td>
<td>–1.39</td>
<td>–0.55 (–0.55)</td>
<td>0.010</td>
<td>–0.00 (–0.07)</td>
</tr>
<tr>
<td>Urban</td>
<td>0.00</td>
<td>0.25</td>
<td>–0.02 (–0.30)</td>
<td>0.028</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Education</td>
<td>0.04</td>
<td>0.36</td>
<td>–0.00 (–0.01)</td>
<td>0.488</td>
<td>0.09 (0.19)</td>
</tr>
<tr>
<td>Inequalityb</td>
<td>0.07</td>
<td>2.92</td>
<td>0.06 (0.51)</td>
<td>0.006</td>
<td>0.05 (0.45)</td>
</tr>
<tr>
<td>Povertyc</td>
<td>0.34</td>
<td>0.36</td>
<td>0.44</td>
<td>0.55</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Two changes were made after the original Fajnzylber et al. model was replicated. First, China was dropped from the sample due to an unrealistically low homicide rate. Second, Hong Kong was not included in the models estimating the effects of poverty because data for this measure were unavailable.

Measure of inequality here is the Gini coefficient. Fajnzylber et al. replicated their pattern of findings with two alternative measures of inequality: the 20–20 ratio (see text) and income polarization (see Models 1 and 2 in Table 5 on p. 20 of Fajnzylber et al., 2002).

The proxy for poverty used here is the natural logarithm of the infant mortality rate.

These are the original results as shown in Model 5 (‘Country Averages’) of Table 3 on p. 13 of Fajnzylber et al. (2002). I was able to replicate these results based upon the data provided to me by Daniel Lederman, the second author on that article.

LnGNP per capita not included in Models 4 and 5 because of high levels of multicollinearity (e.g. VIFs in Model 4 were 5.1 and 5.8 for poverty and Ln GNP per capita, respectively, and even higher in Model 5). Nevertheless, the inferences drawn for poverty and inequality in these two models when Ln GNP per capita was included were the same as shown here. Results available from author.
Table 3  Results of Savolainen replication and re-estimation for males (n = 32)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1: Savolainen model$^d$</th>
<th>Model 2: Basic inequality model</th>
<th>Model 3: Inequality with GNP</th>
<th>Model 4: Poverty replaces inequality$^e$</th>
<th>Model 5: Inequality and poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (β) p-value</td>
<td>b (β) p-value</td>
<td>b (β) p-value</td>
<td>b (β) p-value</td>
<td>b (β) p-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>17.21 0.001</td>
<td>4.55 0.285</td>
<td>5.83 0.236</td>
<td>1.88 0.400</td>
<td>3.56 0.308</td>
</tr>
<tr>
<td>GNP per capita</td>
<td>-0.02 0.180</td>
<td>-0.03 (-0.24)</td>
<td>0.151</td>
<td>-0.06 (-0.02)</td>
<td>0.435</td>
</tr>
<tr>
<td>Percentage 15–24$^a$</td>
<td>-0.00 (-0.06)</td>
<td>-0.29 (-0.10)</td>
<td>0.252</td>
<td>0.00 (0.00)</td>
<td>0.498</td>
</tr>
<tr>
<td>Sex ratio</td>
<td>-15.48 (-0.41)</td>
<td>-12.66 (-0.25)</td>
<td>0.088</td>
<td>-10.99 (-0.22)</td>
<td>0.090</td>
</tr>
<tr>
<td>Welfare spending$^b$</td>
<td>-0.05 (-0.44)</td>
<td>-0.04 (-0.36)</td>
<td>0.024</td>
<td>-0.00 (-0.06)</td>
<td>0.369</td>
</tr>
<tr>
<td>Inequality$^b$</td>
<td>0.06 (0.57)</td>
<td>3.20 (0.71)</td>
<td>&lt;0.001</td>
<td>1.73 (0.38)</td>
<td>0.037</td>
</tr>
<tr>
<td>Poverty$^c$</td>
<td>0.69 0.64</td>
<td>0.66 0.001</td>
<td>1.59 (0.85)</td>
<td>1.12 (0.60)</td>
<td>0.007</td>
</tr>
<tr>
<td>Adj. R$^2$</td>
<td></td>
<td></td>
<td>0.63</td>
<td>0.67</td>
<td></td>
</tr>
</tbody>
</table>

$^a$ In Savolainen’s original model, the absolute value of the proportion of the population aged 15–24 was employed. I employed the natural logarithm of these values when estimating Models 2–5 because the skew statistic for this variable was more than twice its standard error.

$^b$ In Savolainen’s original model, the values for welfare spending and inequality (measured by Gini coefficient) were centred. In Models 2–5 here, I use the uncentred values. Further, I employed the natural logarithm of the values for the Gini coefficient because the skew statistic for this variable was nearly twice its standard error.

$^c$ The proxy for poverty used here is the natural logarithm of the infant mortality rate.

$^d$ These are the original results as shown in Model 1 in Table 2 on p. 1034 of Savolainen (2000). I was able to replicate these results exactly based upon the data provided to me by Savolainen.

$^e$ GNP per capita not included in Models 4 and 5 because of high levels of multicollinearity (e.g. VIFs in Model 4 were 5.1 and 4.7 for poverty and GNP per capita, respectively, and even higher in Model 5). Nevertheless, the inferences drawn for poverty and inequality in these two models when GNP per capita was included were the same as shown here. Results available from author.
### Table 4: Results of Savolainen replication and re-estimation for females (n = 32)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Model 1: Savolainen model</th>
<th>Model 2: Basic inequality model</th>
<th>Model 3: Inequality with GNP</th>
<th>Model 4: Poverty replaces inequality</th>
<th>Model 5: Inequality and poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b (β)</td>
<td>p-value</td>
<td>b (β)</td>
<td>p-value</td>
<td>b (β)</td>
</tr>
<tr>
<td>Intercept</td>
<td>15.09</td>
<td>0.002</td>
<td>8.28</td>
<td>0.116</td>
<td>8.87</td>
</tr>
<tr>
<td>GNP per capita</td>
<td>-0.01</td>
<td>(-0.10)</td>
<td>0.323</td>
<td></td>
<td>-0.02</td>
</tr>
<tr>
<td>Percentage 15–24</td>
<td>-0.00</td>
<td>(-0.06)</td>
<td>0.348</td>
<td></td>
<td>-0.12</td>
</tr>
<tr>
<td>Sex ratio</td>
<td>-14.82</td>
<td>(-0.61)</td>
<td>0.003</td>
<td></td>
<td>-12.09</td>
</tr>
<tr>
<td>Welfare spending</td>
<td>-0.03</td>
<td>(-0.47)</td>
<td>0.050</td>
<td></td>
<td>-0.02</td>
</tr>
<tr>
<td>Inequality</td>
<td>0.02</td>
<td>(0.34)</td>
<td>0.077</td>
<td></td>
<td>1.20</td>
</tr>
<tr>
<td>Poverty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.87</td>
</tr>
<tr>
<td>Adj. R^2</td>
<td>0.38</td>
<td>0.19</td>
<td>0.16</td>
<td>0.31</td>
<td>0.28</td>
</tr>
</tbody>
</table>

**Note:**

- In Savolainen’s original model, the absolute value of the proportion of the population aged 15–24 was employed. I employed the natural logarithm of these values when estimating Models 2–5 because the skew statistic for this variable was more than twice its standard error.
- In Savolainen’s original model, the values for welfare spending and inequality (measured as the Gini coefficient) were centred. In Models 2–5 here, I use the uncentred values. Further, I employed the natural logarithm of the values for the Gini coefficient because the skew statistic for this variable was nearly twice its standard error.
- The proxy for poverty used here is the natural logarithm of the infant mortality rate.
- These are the original results as shown in Model 3 in Table 2 on p. 1034 of Savolainen (2000). I was able to replicate these results exactly based upon the data provided to me by Savolainen.
- GNP per capita not included in Models 4 and 5 because of high levels of multicollinearity (e.g. VIFs in Model 4 were 5.1 and 4.7 for poverty and GNP per capita, respectively, and even higher in Model 5). Nevertheless, the inferences drawn for poverty and inequality in these two models when GNP per capita was included were the same as shown here. Results available from author.
Discussion

In light of the obvious inconsistencies associated with poverty, inequality and homicide between the cross-national and US literatures, three main questions arise: Why has this situation not been addressed more carefully in the literature? Is poverty associated with homicide rates at the national level? Are the strong conclusions drawn thus far about the inequality–homicide association a spurious result of misspecified models? The first question is beyond the scope of this article. The second question was answered in Pridemore (2008), with further evidence provided here. To address the third question, four hypotheses were tested in a way that corrected for the important omission in prior cross-national studies of social structure and homicide—that is, failing to control for a known major confounder—and that addressed the incongruence in the findings from the cross-national and US empirical literatures.

The first hypothesis was that the inequality–homicide association would exist in models that included neither GDP/GNP nor poverty. This hypothesis was supported in all instances. The second was that the inequality–homicide association would remain when controlling for GDP. This hypothesis was supported in all cases. The third hypothesis was that the introduction of a measure of poverty to the typical cross-national models would reveal a consistent positive and significant poverty–homicide association. The results provide support for this expectation in all instances. The final hypothesis was that when inequality and poverty were included together in the same model, the inequality–homicide association would disappear or be inconsistent, while the poverty–homicide association would remain. The findings provide support for this dual hypothesis. There was a positive and significant poverty–homicide association in all models after controlling for inequality. The inequality–homicide association, on the other hand, disappeared in three of the four models.

The findings presented here are consistent with recent research on poverty, inequality and homicide. Based on his initial work on this topic using a larger sample and more recent data than prior studies, Pridemore (2008) came to the same conclusions as those drawn here. In addition, a careful study by Paré (2006), again using independently collected data and carrying out his own unique analyses, reached essentially the same conclusion. In short, employing proxies for poverty (infant mortality and the Human Poverty Index mentioned above) similar to that used in my study, Paré found no inequality–homicide association in his sample of 63 nations, but did find a significant poverty–homicide association. Finally, though slightly different in nature and intent, Neumayer’s (2003) cross-national homicide study is also relevant. Pooling data from about 120 countries over time and employing a greater number of institutional correlates, he found no effect of inequality on national homicide rates.

---

Footnotes:

7It is worth noting, as well, that infant mortality has been included as an individual variable in at least two prior analyses. Conklin and Simpson (1985) employed it as an indicator of social inequality, and Jacobs and Richardson (2008) as a measure of social disorganization. Both studies found infant mortality to be positively and significantly associated with homicide rates.

8Between Pridemore’s (2008) results and those presented here, findings are consistent across three distinct studies with data collected and analysed by different authors and those differed on nations in the sample, years in which observations were taken, measures of inequality, type of homicide rate (i.e. overall and sex-specific rates) and estimation procedures (OLS and WLS).

9Nevertheless, these new findings do not invalidate the Savolainen (2000) and Fajnzylber et al. (2002) studies employed as examples. Although the inequality–homicide finding was important in the former, for example, it was not the focus of the study. Instead, Savolainen was testing hypotheses from institutional anomie theory (Messner and Rosenfeld 2006) and was concerned with how the strength of non-economic social institutions may moderate the effects of inequality on violence.

762
The strength and meaning of the support for each of these hypotheses have implications for theory and method. Although poverty and inequality are often highly correlated empirically, and while there are reasons to expect them to be related conceptually, the theoretical literature on why we should expect each to be associated with homicide rates is very different. While several theories ‘claim’ poverty, most of their explanations for its association with homicide rates are at the macro level. Conversely, though often discussed and tested at the macro level, inequality normally is tied theoretically to violence via individual-level explanations (Chamlin and Cochran 2005), usually as an outcome of frustration resulting from the unfair distribution of resources (Blau and Blau 1982). There is nothing wrong with this reductionist approach, as long as we recognize that, following this logic, the impact of inequality on homicide represents a compositional effect. If there is a structural level effect of inequality on homicide rates, a clearer theoretical explanation is required, since inequalities in homicide rates do not necessarily mean that inequality causes higher homicide rates. Similar issues have received considerable attention, as they relate to other forms of morbidity and mortality (Goldman 2001; Marmot et al. 1995) and to neighbourhood and structural effects on health (Kawachi and Berkman 2003).

The current findings could actually represent a chance for integrating macro-level aspects of poverty and inequality as they relate to area violence rates. There is no doubt, for example, that cultural, social, political and economic systems act unequally to stratify groups and areas with regard to access to and possession of a range of resources, but this inequity does not provide a macro explanation in itself for an outcome like variation in homicide rates. It could be, however, that once the groups are stratified, the more proximate conditions concomitant with the concentration of poverty lead to negative outcomes like higher rates of homicide.

The findings presented here should not be viewed as a definitive statement that the inequality–homicide association does not exist at the cross-national level, or that the poverty–homicide association should now be assumed. Instead, this article should be viewed as an addition to the literature that (1) explicitly addresses the incongruence between the cross-national and US literatures, (2) reveals what happens when we correct for an important omission in the prior cross-national research, and (3) provides a cautionary note that suggests that the strong conclusions drawn thus far about the inequality–homicide association from the cross-national literature may have been premature. The latter point is in line with earlier work by Rosenfeld and Messner (1991). In that study, the authors found no association between inequality and homicide in a sample of small nonindustrial societies, and concluded that ‘some of the most important findings of cross-national research in sociology are not readily generalizable across different types of societies’ (Rosenfeld and Messner 1991: 51).

On the other hand, the inequality–homicide association has retained its strength in the face of important confounders in other studies. Although average economic well-being and poverty are theoretically distinct in their expected associations with homicide rates, empirically, they are often highly correlated (as measured, say, by per capita GDP and infant mortality, respectively). Infant mortality has also been shown to be highly correlated with measures of social development or even included in indices designed to gauge this concept. That inequality retains its association with homicide rates in some of these instances in which these two controls are present suggests there is further research to be done before the issue is resolved.
Another important implication of the results presented here is that we should expand the theoretical and methodological discourse as it relates to the social production of homicide rates cross-nationally. For example, given the prior findings, there is a growing discursive literature on the inequality–homicide association’s meaning and interpretation. This is reasonable, but, by focusing so heavily on inequality in recent years, and being so assured of its association with homicide, we have likely discouraged thinking about other important possibilities, thus hindering innovation in theory, method, measurement and policy development. While economics is important, scholars would do well to introduce variables that test other theories, reduce significantly the prediction errors and control for potentially important confounders. These might include incarceration rates, types and levels of policing and government characteristics like levels of corruption or strength of democratic institutions.

Finally, a logical next step is to test the moderating effects of social support, welfare spending, the strength of non-economic institutions and decommodification on the strength of the association between crime and other negative social and economic conditions like poverty (Paré 2006) and social change (Kim and Pridemore 2005). Nations that score highly on decommodification are better at providing support for citizens in the lowest economic strata, thereby reducing poverty (and, as a by-product, inequality). Thus, research that finds an association between decommodification and homicide rates, or that the effects of inequality on homicide are buffered in nations with higher levels of decommodification (Messner and Rosenfeld 1997; Savolainen 2000), is suggesting that poverty is what matters. These policies are not meant to reduce relative deprivation, but, instead, to reduce absolute deprivation by attempting to provide the resources necessary for healthy daily living. In fact, Paré’s (2006) work ‘suggests that the negative relationship between social welfare and the homicide rate observed in previous studies is attributable to poverty reduction, not income inequality reduction’ (Paré 2006: iii).

Limitations

We must consider a few limitations when interpreting the results of the analyses presented here. First, only two prior studies were replicated and re-evaluated. It would be ideal, and it was my original intention, to replicate as many prior cross-national studies as possible. However, when we corresponded with the authors of about half the studies listed in Table 1, the outcome was disheartening. Only Dr Lederman and Dr Savolainen agreed to provide their data to us,10 with most authors stating they were no longer in possession of the data used to carry out the analyses. Many of these studies were published long ago and those authors can be forgiven for not possessing the original punch cards or magnetic tapes on which their data were stored. Many other studies, however, were published (some in prominent journals) much more recently and these data should be readily available and provided to others who wish to replicate the work for scientific purposes. Unfortunately, this experience speaks poorly to the state of this area of the discipline and it must be rectified. Under normal circumstances, the failure to provide data in this situation would at best generate considerable scepticism about the findings from such studies. Many medical and public health journals require a signed

---

10Dr Savolainen’s analyses were based on data collected by Dr Steve Messner for an earlier study and the latter also kindly agreed to provide me with these data.
agreement that stipulates authors must retain their data and provide them to scholars that request the data for replication purposes. A statement about data sharing for replication purposes is included in the Certification of Compliance with APA Ethical Principles that must be signed by all authors publishing in any APA journal and a similar statement about data sharing is included in the American Sociological Association’s Code of Ethics. Replication is a fundamental element of science and perhaps it is time for criminology and other social science journals to take this more seriously.

A second limitation is that defining and measuring poverty are difficult for nations at different levels of development, so there exists no single direct measure of poverty at the national level. Infant mortality, however, is commonly employed as a proxy for poverty due to its many advantages as an indicator of deprivation. First, empirical support for a correlation between poverty and infant mortality at the national level is so consistent that it is now assumed (Antonovsky and Bernstein 1977; Burnside and Dollar 1998; Firebaugh and Beck 1994; Frey and Field 2000; Ross 2006). Sub-national studies in the United States (Strait 2006) and elsewhere also commonly find a strong association between the two. A second advantage is that infant mortality is not dependent on arbitrary definitions of income poverty. Measures like household income do not capture social benefits, for example, which vary substantially by nation. A third advantage is that infant mortality is a more accurate measure of human poverty than income-based indicators. Conceptually, traditional measures of poverty based on income are narrowly defined (United Nations Development Programme 2006), whereas the UNDP’s indices of human poverty, for example, are constructed from indicators that are closely associated with infant mortality. Methodologically, while Reddy and Pogge (2005) have highlighted the errors in the World Bank’s estimates of income poverty, infant mortality rates are based on data from vital statistics registration systems that are more complete in their coverage than surveys of household income. Even where vital statistics registration systems lack complete coverage, this is negatively correlated with level of development, meaning that the statistical effect on tests like those performed here is to bias estimates in a conservative direction. Finally, although using infant mortality as a proxy for poverty is more common in other disciplines than in criminology, it has been used as an indicator of or an instrumental variable for poverty in research on social structure and homicide (Loftin and Parker 1985; McDowall 1986; Messner 1989).

A final limitation, while methodological in nature, plays an important role for the substantive interpretation of these results and their theoretical implications. Measures of absolute deprivation and inequality are often highly collinear. A similar problem is collinearity between indicators of poverty, such as infant mortality, and indicators of development and average well-being, such as GDP or the development index used by many scholars (see Table 1). While these are theoretically distinct, they are often difficult to

---

11For APA, s. 8.14, entitled ‘Sharing Research Data for Verification’, states that ‘(a) After research results are published, psychologists do not withhold the data on which their conclusions are based from other competent professionals who seek to verify the substantive claims through reanalysis and who intend to use such data only for that purpose, provided that the confidentiality of the participants can be protected and unless legal rights concerning proprietary data preclude their release. This does not preclude psychologists from requiring that such individuals or groups be responsible for costs associated with the provision of such information. (b) Psychologists who request data from other psychologists to verify the substantive claims through reanalysis may use shared data only for the declared purpose. Requesting psychologists obtain prior written agreement for all other uses of the data’ (Ethical Principles of Psychologists and Code of Conduct 2002: 1071). The analogous statement by ASA is in s. 13.05, entitled ‘Data Sharing’ (American Sociological Association 1999).
distinguish empirically. For example, in Pridemore’s (2008) article, the r for GDP per capita and infant mortality was −0.83. In Messner’s (1989) analysis, the r for per capita GNP (ln) and infant mortality was −0.81 and infant mortality’s r for his development index was −0.92 (Messner, personal communication, 21 February 2007). Similarly, in the present analyses, the GNP measures were dropped from the final models including both poverty and inequality due to high levels of multicollinearity (though it is important to point out that the inferences for poverty and inequality remained the same when it was included). Thus, it is curious that many studies have found an inequality–homicide association when controlling for development/general economic well-being (via GDP/GNP), since the latter is so often highly correlated with indicators of poverty, but that when the proxy for poverty is included here, the inequality–homicide association disappears.

This may be associated more generally with the fact that the influence of multicollinearity on substantive inferences can be problematic due to partialing (Gordon 1968; Land et al. 1990). When the multiple regression model is estimated with two highly correlated variables, $X_1$ (e.g. inequality) and $X_2$ (e.g. poverty), much of the effect on $Y$ of $X_1$ can be allocated to $X_2$ if the latter has the higher correlation with $Y$. This can result in a significant test statistic for $X_2$ and a null test statistic for $X_1$ when, in fact, both may be associated with $Y$. This possibility, however, proves the point of the present article. That is, the mission here is not to argue for poverty and against inequality, but instead to point out that the strong conclusions drawn thus far about the latter may not be warranted without further careful research.12

Conclusion

Nearly every cross-national study of social structure and homicide published in the last three decades found an inequality–homicide association. This led to strong conclusions about this relationship and widespread acceptance of its existence. Yet, while many studies controlled for general economic well-being, none included a control for poverty. This is questionable given the focus on the criminogenic effects of poverty in the theoretical literature and the repeated findings of a poverty–homicide association in the US empirical literature. This incongruence between the related cross-national and US studies has not been addressed in the literature. In order to correct for this omission, a proxy for poverty was included in models replicated from prior careful cross-national studies of social structure and homicide. The results were clear: the poverty–homicide association held in all cases when controlling for inequality, while the inequality–homicide association disappeared in two of three cases when controlling for poverty.

This study provides important contributions to the literature. First, it presents results consistent with Pridemore (2008; see also Paré and Felson 2010) using independent data, thus providing convergent validity to recent research findings. Second, these results help to align the findings from the US and cross-national empirical literatures that before were highly incongruent in terms of the effects of relative and absolute deprivation on homicide rates. Third, all this was done in a straightforward manner by

---

12While it is beyond the scope of the current article, some may argue that the recurring problem of multicollinearity in these studies raises questions about the viability of this genre of study, at least until more specific and independent measures can be found or created. Another critique of this genre includes questions about the efficacy of including wealthy Western nations and developing nations in the same analysis.
replicating two prior important studies and simply adding a proxy for poverty to their models. Finally, this type of replication and extension is crucial to the accumulation of knowledge, especially in the social sciences, and the process itself is informative and often revealing. In this case, for example, we discovered important limitations related to data sharing that could have implications for the scientific record on this phenomenon.

The intention here is not to argue that inequality is unimportant or that poverty is a theoretically superior explanation of the variation in national homicide rates. Rather, the aim of this paper is to point out the inconsistencies between the cross-national and US literatures on social structure and homicide and to suggest that we may not know as much as we think we know about the deprivation–homicide connection at the national level. The results of the various analyses presented here suggest that the inequality–homicide association at the cross-national level is neither as strong nor as consistent as previously thought. This means that the strong conclusions drawn thus far about the inequality–homicide association may need to be reassessed, since it may be a spurious result of model misspecification. Though contrary to findings from prior cross-national studies, the conclusions drawn here are congruent with what we know about poverty, inequality and violence from US studies, and thus begin to reconcile the previously disparate findings from the cross-national and US literatures on social structure and homicide.

**Acknowledgements**

I thank Jukka Savolainen and Daniel Lederman for providing me with the data necessary to replicate their studies, Jeff Gruenewald and Krista Eckhardt for their invaluable research assistance, and Jukka Savolainen, Colin Loftin and Steve Messner for their comments on and critiques of earlier drafts of this manuscript. I also thank Paul Paré for sharing his dissertation with me. Paul’s careful work deserves equal credit, as our discoveries were simultaneous and without the knowledge of each other’s research.

**Appendix A: Nations Used in the Three Studies**

<table>
<thead>
<tr>
<th>Prinsemore (N = 46)</th>
<th>Germany</th>
<th>Paraguay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Greece</td>
<td>Peru</td>
</tr>
<tr>
<td>Australia</td>
<td>Guatemala</td>
<td>Poland</td>
</tr>
<tr>
<td>Austria</td>
<td>Hungary</td>
<td>Portugal</td>
</tr>
<tr>
<td>Belgium</td>
<td>Ireland</td>
<td>Russia</td>
</tr>
<tr>
<td>Brazil</td>
<td>Israel</td>
<td>Spain</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Italy</td>
<td>Sri Lanka</td>
</tr>
<tr>
<td>Canada</td>
<td>Japan</td>
<td>Sweden</td>
</tr>
<tr>
<td>Chile</td>
<td>Latvia</td>
<td>Switzerland</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>Lithuania</td>
<td>Thailand</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>Mexico</td>
<td>UK</td>
</tr>
<tr>
<td>Denmark</td>
<td>Netherlands</td>
<td>US</td>
</tr>
<tr>
<td>Dominican Rep.</td>
<td>New Zealand</td>
<td>Uruguay</td>
</tr>
<tr>
<td>Ecuador</td>
<td>Nicaragua</td>
<td>Venezuela</td>
</tr>
<tr>
<td>El Salvador</td>
<td>Norway</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>Panama</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fajnzylber et al. (N = 39)

Australia
Belgium
Brazil
Bulgaria
Canada
Chile
China
Colombia
Costa Rica
Denmark
Dominican Republic
Finland
France
Germany

Greece
Hong Kong
Hungary
Ireland
Italy
Japan
Mauritius
Mexico
The Netherlands
New Zealand
Norway
Panama

Poland
Romania
Singapore
Spain
Sri
Thailand
Trinidad and Tobago
United Kingdom
United States
Venezuela

Note: in Appendix B, Table B1, Fajnzylber et al. list Dominica as one of the nations included in their homicide analysis. It is clear from the data they provided to me, however, that they actually used the Dominican Republic and not Dominica.

Savolainen (N = 32)

Australia
Austria
Brazil
Bulgaria
Canada
Chile
Colombia
Costa Rica
Czech Republic
Denmark
Ecuador
El Salvador
Finland
France
Germany
Hungary

Ireland
Israel
Latvia
Lithuania
Mexico
The Netherlands
Nicaragua
Norway
Panama
Paraguay
Poland
Romania
Spain
Sweden
United Kingdom
United States

References


769
McDonald, L. R. (1976), The Sociology of Law and Order. Montreal: The Book Center.


